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Impact of Conductive Education on Individuals with Stroke Syndrome

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CONDUCTIVE EDUCATION FOR INDIVIDUALS WITH CHRONIC STROKE: A PILOT STUDY

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BACKGROUND

Purpose/Hypothesis: The purpose of this study was to investigate the impact of Conductive Education (CE) on adults with chronic stroke, replicating and expanding upon the study at Cannon Hill House (CHH) by Brown et al8. We hypothesized that completing the CE program would improve function and change neural connectivity.

CE is a transdisciplinary, motor-learning based intervention which uses multiple facilitations including manual facilitation, equipment, rhythmic intention (a cadence facilitation), first person verbal articulation, and the group environment3 to impact a person's motor learning and rehabilitation. An aim of this pilot study was to replicate and expanded upon a previous study examining the impact of CE as an intervention for adults with chronic stroke4.

The location and severity of damage to the brain after a stroke influences the extent of functional limitations experienced by the stroke survivor1. After injury, measurable physiological changes can be correlated with functional clinical measures2. With physical rehabilitation interventions, functional impairments can be lessened, presumably through mechanisms of neuroplasticity. Thus a persons participation may improve as a result of improved performance. Though interventions are often effective for restoring at least partial function for individuals with stroke, little is known about what underlies the positive results for specific interventions.

SUBJECT AND METHODS

All research protocol were with the approval of the GSU IRB.

Study Design: *performed*

- Pre-test/Post-test analysis of functional outcome measures and neural structural changes

Subjects

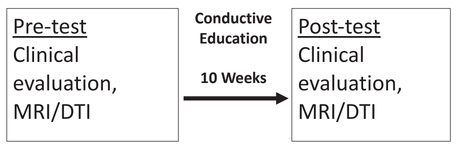
- Four adult subjects, >1yr status post stroke, with chronic hemiparetic sequelae
- No subjects had aphasia or were currently in PT or OT
- 1F, 3M, Lesions: pontine-level (n = 2/4); subcortical (n = 2/4)

Intervention

- Transdisciplinary Conductive Education Program
- 10 weekly, 2-hour CE program sessions lead by a DPT and a certified CE Teacher.
- Each session incorporated the pedagogy of CE specifically including sitting, standing, and walking programs into all sessions.
- In total, the subjects participated in 1200 hours of group intervention. Sessions were videotaped for qualitative analysis.

Outcome measures

- Quantitative pre-test and post-test measures included:
- Functional outcomes: Barthel, Timed up and Go (TUG), 10 meter walk test, Stroke Impact Scale (SIS)
- MRI/DTI imaging (focused on cortical structure, myelination and oxygen uptake).

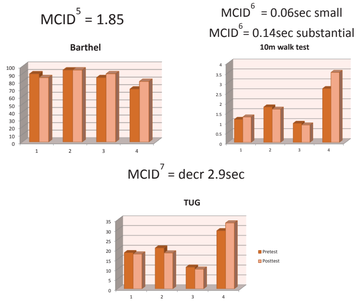


Analysis

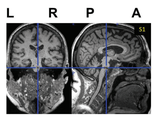
- Pre/post intervention changes in outcome measures and imaging
- Outcome measure assessed for Minimally Clinically Important Differences (MCID), when available

RESULTS

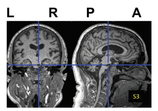
Collectively the group decided to focus their efforts more on upper extremity return to function. This resulted in the majority of the sessions focused on improving strength and agility of the hemiparetic upper extremity with less focus on balance and ambulation. Participants showed a more dramatic improvement in fine motor skills then gross motor skills.



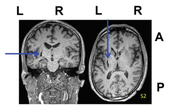
Lesion
L = left, R = right,
P = posterior, A = anterior



S1 Lesion: Right Pons



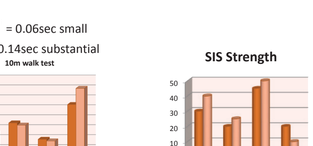
S3 Lesion: Right Pons

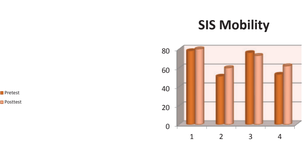


S2 Lesion: Left Putamen/ Internal Capsule

S4 Lesion: Right Hemisphere

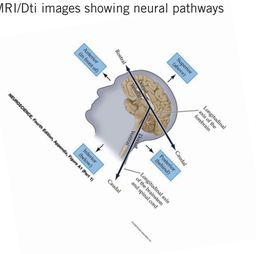
Gray Maatter (GM) Density Changes
Red = increase, Blue = decrease

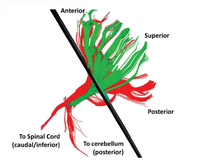


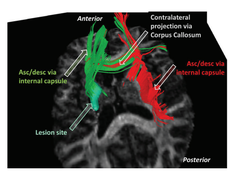


Participants demonstrated individualized increases in gray matter density, consolidation of connectivity, and functional improvements after the 10 week Conductive Education Program.

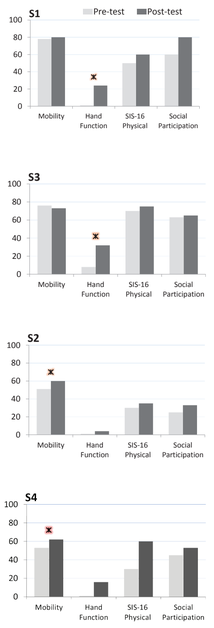
Connectivity Changes
MRI/Dti images showing neural pathways







Functional Changes
Stroke Impact Scale
(SIS, range 0-100
Meets or exceeds Minimally Clinically Important Difference (MCID)



Compared to pre-test measures, clinically significant improvements post CE intervention were seen in several quantitative Functional Outcome Measures. Specifically, clinically significant improvements were seen on the Barthel (n = 2/4 participants) 10 meter walk test (n = 3/4), SIS ADL/IADL subscale (n = 2/4) and SIS hand function subscale (n = 3/4), also paired t-test statistically significant). Raw score improvements not reaching significance were seen in SIS subscales of strength (n = 2/4 subjects), memory (n = 3/4), emotion (n = 3/4), and social participation (3/4). No significant changes were seen in the TUG speed or the Community Integration Scale. Absence of changes could be attributed to each subject was now moving with more intention and caution after the intervention, minimizing ballistic movements and sloppy form (TUG speed) and cultural issues such as not cooking, cleaning, or shopping prior to stroke (Community Integration Scale).

Additionally, imaging data showed increased neural connectivity. Pretest MRI/DIT imaging revealed individually varying location and severity of lesions. Likewise, the degree of improvement after CE also varied by individual.

CONCLUSIONS

- The positive findings from our study support the CHH study findings. Additionally, our imaging results supported our subjects' functional improvements. The subjects reported improved quality of life and function around their home and community. For some patients with chronic stroke, a 10-week Conductive Education intervention may provide them with peer support and improved functionality.
- All participants entered the program with a goal of improving hand function. This goal was achieved after the 10-week program. As participants increased awareness of their gait form, better gait patterns were demonstrated (possibly contributing to slower TUG and 10 MWT times). This indicates a shift in focus from speed to form and gait pattern after the study.
- This study did support the Cannon Hill study findings of improved hand function and social participation on the SIS and the trend towards improvement on the Barthel.

CLINICAL RELEVANCE

In the US, Conductive Education is not readily used in Stroke rehabilitation. The positive findings lend credence to using CE with patients with motor impairments following stroke. This study demonstrates that individuals with chronic impairments from a stroke can show improvement with focused group intervention using CE pedagogy. These improvements help the clients improve function as well as decrease social isolation. Gains in independence, self-confidence and community participation emerge.

Interestingly, we chose primarily gross motor outcome measures but training ultimately was more fine motor focused due to group determined focus of the intervention. We found a significant improvement in hand function and overall score as reported by the participants using the SIS.

Moving forward, the group should be polled regarding desired goals and then the outcome measures chosen to reflect the intervention.

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